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sec 3

Q3:- a) A: different numbers

$P(A) = \frac{30}{36}$

$E_a = \{(1,5)(2,4)(3,3)(4,2)(5,1)\}$

$P(E_a) = \frac{5}{36}$

$P(A \cap E_a) = \frac{4}{36}$

$P(E_a|A) = \frac{P(E_a \cap A)}{P(A)} = \frac{4}{36} * \frac{36}{30} = \frac{4}{30} = \frac{2}{15}$

b) E_b: An ace appear

$P(E_b) = \frac{11}{36}$, $P(E_b \cap A) = \frac{10}{36}$

$P(E_b|A) = \frac{P(E_b \cap A)}{P(A)} = \frac{10}{36} * \frac{36}{30} = \frac{1}{3}$

c) E_c: sum is 4 or less $\{(1,1)(1,2)(1,3)(2,1)(2,2)(3,1)\}$

$P(A \cap E_c) = \frac{4}{36}$

$P(E_3|A) = \frac{4}{36} \times \frac{36}{30} = \frac{4}{30} = \frac{2}{15}$

Q8:- a) Since A, B are independent

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= P(A) + P(B) - P(A)P(B)$

$P(A \cup B) - P(A) = P(B)(1 - P(A))$

$P(B) = \frac{P(A \cup B) - P(A)}{1 - P(A)} = \frac{2/3 - 1/2}{1/2} = \frac{1}{3}$

b) $P(A|B) = P(A) = 1/2$ ⇐ They are independent

c) $P(B^c|A) = P(B^c)$

$= 1 - P(B) = 2/3$

Q12: A { 5 ✓ , 3 ✗ } B { 3 ✓ , 2 ✗ }

a) $P(A\checkmark) = \frac{5}{8}$, $P(B\checkmark) = \frac{3}{5}$

$P(A\checkmark \cap B\checkmark) = P(A)\,P(B) = \frac{5}{8} * \frac{3}{5} = \frac{3}{8}$

b) $E_b = \{(A\checkmark, B\times)(A\times, B\checkmark)\}$

$P(E_b) = \frac{5}{8} * \frac{2}{5} + \frac{3}{8} * \frac{3}{5} = \frac{10+9}{40} = \frac{19}{40}$

c) $E_c = \{(A\times, B\checkmark)\}$

$P(E_c) = \frac{3}{8} * \frac{3}{5} = \frac{9}{40} = P(E_c \cap E_b)$

$P(E_c|E_b) = \frac{P(E_c \cap E_b)}{P(E_b)} = \frac{9}{40} * \frac{40}{19} = \frac{9}{19}$

Q13:- a) A: win twice at least $= \{(\omega,\omega,T)|(\omega,T,\omega)(T,\omega,\omega)(\omega,\omega,\omega)$

$P(A) = 3P(\omega)^2 P(T) + P(\omega)^3$

$= 3 * 0.6^2 * 0.1 + 0.6^3 =$

$= 0.108 + 0.216 = 0.324$

b) $B = \{(\omega, L, T)(T, L, \omega)(L, \omega, T)(T, L, \omega)$
$(\omega, T, L)(L, T, \omega)\}$

Q17:- $E = \{(r, r, \omega)\}$

$\downarrow \quad \downarrow \quad \downarrow$

$\frac{7}{10} \quad \frac{6}{9} \quad \frac{3}{8}$

$P(E) = \frac{7}{10} * \frac{6}{9} * \frac{3}{8} = \frac{126}{720} = \frac{7}{40}$